



The effect of temperature on mortality in Stockholm 1998-2003: A study of lag structures and heatwave effects

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Abstract:

Aims: To describe seasonal patterns of natural mortality in Stockholm as well as the temperature-mortality relationship and the lag structure for effects of high and low temperatures, to describe the impact of high temperatures on cardiovascular and respiratory mortality, and the general effect of high temperatures in different age groups; and to investigate whether there is any indication of an additional heatwave or cold spell effect. **Methods:** Generalized additive Poisson regression models were fitted to mortality and temperature data from Stockholm from the period 1998-2003, controlling for influenza, season, time trends, week day, and holidays. **Results:** The mortality in Stockholm followed a seasonal pattern, with a peak in the winter season. The "optimal temperature" was around 11-12 degrees C. Above this temperature, the cumulative general relative risk (RR) corresponded to a 1.4% (95% confidence interval (CI)Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.8-2.0) increase per degrees C, and below this temperature the cumulative RR corresponded to a 0.7% (95% CIEuro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.5-0.9) decrease per degrees C. Age-specific RRS were estimated above the threshold for age < 65 years, age 65-74 years, and age > 74 years, with estimated increases of 0.5% (not significant), 1.5% (not significant) and 1.6% (95% CIEuro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.6-2.3) per degrees C, respectively. The RRs for cardiovascular and respiratory causes were studied above the breakpoint, and estimated to be 1.1% (95% CIEuro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.3-2.0) and 4.3% (95% CIEuro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)2.2-6.5) per degrees C, respectively. The lag structures from moving averages and polynomial distributed lag models coincided with a rather direct effect during summer (lag 0 and 1) and a more prolonged effect during winter, covering about a week. The inclusion of an indicator of heatwaves added an increase in daily mortality of 3.1-7.7%, depending on the threshold. **Conclusions:** These results show that the predicted increase in heat events must also be taken seriously in Scandinavia, whatever the extent of the decreasing cold related mortality. The relative risks associated with heat and heatwaves seem stronger than the cold effects and thus a larger public health threat, since northern populations have not yet adapted to heat as have been done over a long time for the cold periods. The pressure on the healthcare sector will probably increase in the warm season, periodically it may become even greater than the pressure due to cold weather, which will be a new phenomenon for the healthcare sector to cope with. We need to be prepared for these kind of events by developing adaptation and education strategies to handle the consequences that a warmer climate will have for public health and the healthcare sector.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Cold, Extreme Heat, Fluctuations

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Sweden

Health Impact:

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality, Respiratory Effect

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): cardiovascular disease mortality

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : respiratory disease mortality

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified